Thesis Title	A Comparative Study of Scintillation Response of $Bi_4Ge_3O_{12}$ and $(Lu,Y)_2SiO_5$:Ce Single Crystals
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Candidate	Miss Nattasuda Yawai
Thesis Advisor	Assoc. Prof. Dr. Weerapong Chewpraditkul
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Abstract

The scintillation properties of $Bi_4Ge_3O_{12}$ (BGO) and $(Lu,Y)_2SiO_5$:Ce (LYSO:Ce) single crystals at room temperature under UV and γ-ray excitations are presented. For BGO, under UV excitation, the 6p $\rightarrow$ 6s emission band of Bi^{3+} ions was observed at 480 nm, whereas the 5d $\rightarrow$ 4f emission band of Ce^{3+} ions was observed at 420 nm in the LYSO:Ce. Light yield and energy resolution at 662 keV γ-rays from a ^{137}Cs source were measured with a Photonis XP5200B photomultiplier. The light yields of 9,670 ± 1,000 and 28,330 ± 2,800 photons per MeV with a size of 5x5x1 mm^3 and measured at 4 μs shaping time in the spectroscopy amplifier were obtained, respectively, for BGO and LYSO:Ce. The energy resolutions of 8.58 ± 0.2 and 8.51 ± 0.2 % at 662 keV γ-rays for BGO and LYSO:Ce were obtained, respectively. The intrinsic light yield and loss coefficient were evaluated. The estimated photofraction in pulse height spectrum at 662 keV γ-rays and the total mass attenuation coefficient at 59.5 and 662 keV γ-rays were also determined and compared with the theoretical ones calculated using XCOM program.

Keywords: BGO Single Crystal / Energy Resolution / Light Yield / LYSO:Ce Single Crystal / Non-Proportionality of the Light Yield / Scintillation